इंटरनेट मानक

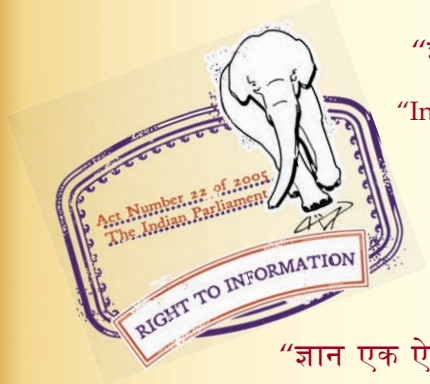
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 3445 (1992): Forged steel rolls [MTD 16: Alloy Steels and Forgings]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

IS 3445 : 1992
(Reaffirmed 2004)

भारतीय मानक

गढ़ी इस्पात के रोल — विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

FORGED STEEL ROLLS — SPECIFICATION

(First Revision)

UDC 669·14 - 134 - 122

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

June 1992

Price Group 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Steel Forgings Sectional Committee had been approved by the Metallurgical Engineering Division Council.

Rolls are required to possess high strength in service and they should be capable of withstanding extreme pressures and heavy shock loads. This standard covers requirements for forged steel rolls both alloyed and unalloyed to be used in hot and cold rolling of ferrous and non-ferrous products. These rolls may also be used after re-conditioning, if necessary. Composite rolls are not covered by this standard.

This standard was first published in 1966 and in this revision following major modifications have been made:

a) Seven new steels have been included in Table 1.

b) Ultrasonic test, Magnetic particle test and inclusion rating have been incorporated as mandatory requirements.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FORGED STEEL ROLLS — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard covers the requirements of plain carbon and alloyed forged steel rolls for use in hot or cold reduction of ferrous and non-ferrous products.

2 REFERENCE

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
1387 : 1967	General requirements for the supply of metallurgical materials (*first revision*)
1956 (Part 6) : 1976	Forging (including drop forging) (*first revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, definitions of forging terms shall be as given in IS 1956 (Part 6) : 1976.

4 SUPPLY OF MATERIAL

4.1 General requirements relating to the supply of material shall be as laid down in IS 1387 : 1967.

5 MANUFACTURE

5.1 Forged steel rolls shall be manufactured from killed steel made by the open hearth, electric, basic oxygen or any other approved process. When so desired, the purchaser and manufacturer may agree to a particular secondary steel refining process for special purpose rolls.

5.2 A sufficient discard shall be made from each ingot to ensure freedom from piping, marked segregation, flakes, burrs and other harmful defects.

5.3 The rolls shall be forged under a press, hammer or by automatic forging machine to work the metal throughout its section within the range of forging temperature. The reduction factor should be sufficient to break up the as-cast structures to effect welding of inside pipings and obtain refinement of the grain structure. The final product should be free from harmful defects such as internal cracks, voids, piping, carbie segregation, etc.

5.4 The rolls after forging shall be given suitable heat treatment based on their design and chemical composition. The forgings may be supplied, either in normalised, double normalised and tempered or hardened (volume or induction) and tempered conditions. The method of heat treatment shall be subject to mutual agreement between the manufacturer and the purchaser. The forgings shall have to undergo controlled cooling immediately after forgings when alloy steels and heavier sections are involved. The controlled cooling cycle shall be according to the grade of steel forgings.

5.5 The purchaser shall specify in the enquiry, contract or order, the type of roll required showing complete dimensions, hardness range, surface finish and use. Any other requirements like heat treatment, etc, shall also be specified.

6 CHEMICAL COMPOSITION

6.1 Unless otherwise specified, the chemical composition shall be subject to mutual agreement between the manufacturer and the purchaser.

6.1.1 Chemical composition of different types of forged steel rolls is given in Table 1 for information and guidance only.

7 PHYSICAL REQUIREMENTS

7.1 Hardness

The manufacturer shall supply rolls to the hardness ranges as agreed to between the manufacturer and the purchaser. In case of hardened rolls the hardness range of either 6 to 10 points shore Scleroscope or 80 to 100 points Vickers hardness should be allowed. When so desired the purchaser and manufacturer may agree to hardness requirement in HB or HRC. The variation in hardness at the barrel and journals shall be as agreed to between manufacturer and purchaser for better designed life.

7.2 Inclusion Rating

When so required, inclusion rating of the forged roll may be specified by the purchaser at the time of enquiry and order.

8 PHYSICAL TESTS

8.1 Hardness Test

Each roll shall be tested for hardness and shall be within the limits specified in the order. The

Table 1 Chemical Composition of Forged Steel Rolls

(*Clause* 6.1.1)

Sl No.	Steel Designation [*See* IS 1762 (Part 1) : 1974]	C	Mn	Si	Ni	Cr	Mo	V	W	S Max	P Max
1.	55C8	0·50-0·60	0·60-0·90	0·10-0·35	—	—	—	—	—	0·040	0·040
2.	55Cr5	0·50-0·60	0·35-0·65	0·10-0·35	0·3 *Max*	1·00-1·30	—	—	—	0 040	0 040
3.	60Cr5	0·55-0·65	0·80-1·00	0·10-0·35	0·4 *Max*	1·00-1·30	—	—	—	0 040	0·040
4.	46Ni5Cr2	0·37-0·55	0·50-0·80	0·10-0·35	1·0 -1·4	0·45-0·75	—	—	—	0·040	0·040
5.	60Ni5Cr3	0·55-0·65	0·50-0·80	0·10-0·35	1·1 -1·5	0·60-0·90	—	—	—	0 040	0·040
6.	88Cr6	0·80-0·95	0·25-0·35	0·10-0·35	0·3 *Max*	1·40-1·70	—	—	—	0·040	0·040
7.	90Cr8	0·85-0·95	0·20-0·35	0·10-0·35	0·3 *Max*	1·70-2·10	—	—	—	0·040	0·040
8.	40Ni14	0·35-0·45	0·50-0·80	0·10-0·35	3·20-3·60	0·30 *Max*	—	—	—	0·040	0·040
9.	40Ni6Cr4Mo3	0·35-0·45	0·40-0·70	0·10-0·35	1·25-1·75	0·90-1·30	0·20-0·35	—	—	0·040	0·040
10.	80Cr6Ni4Mo10	0·75-0·85	0·40-0·70	—	1·00-1·20	1·40-1·60	0·40-0·60	—	—	0·040	0·040
11.	75Cr8Mo7	0·70 0·80	0·40-0·70	—	—	1·80-2·00	0·30-0·40	—	—	0·040	0·040
12.	85Cr7Mo12V1	0·80-0·90	0·18-0·30	0·10-0·35	0·30 *Max*	1·50-1·80	0·10-0·15	0·05-0·10	—	0·040	0·040
13.	90Cr7V2	0·85-0·95	0·20-0·45	0·10-0·35	0·30 *Max*	1·40-1·70	—	0·10-0·25	—	0·040	0·040
14.	90Cr7Mo2V2	0·85-0·95	0·20-0·35	0·10-0·35	0·30 *Max*	1·40-1·70	0·20-0·30	0·10-0·25	—	0·040	0·040
15.	90Cr8W2	0·85-0·95	0·20-0·35	0·10-0·35	0·30 *Max*	1·70-2·10	—	—	2·30-0·60	0·040	0·040
16.	80Cr7W2	0·75-0·85	0·50-0·80	0·10-0·35	2.70-3·20	1·40-2·10	—	—	0·50-0·70	0·040	0·040
17.	45Ni6Cr6W3	0·40-0·50	0·50-0·80	0·10-0·35	1·20-1·80	1·30-1·70	—	—	0·50-0·80	0·040	0·040
18.	—	0·80-0·90	—	—	—	2·30-2·70	alloys Mo,V,Ni,Ti,Si,Co			—	—
19.	—	0·80-0·90	—	—	—	3·0	alloys Mo,V,Ni,Si			—	—
20.	—	0·80-0·90	—	—	—	5·0	alloys Mo,V,Ni			—	—
21.	85Cr52	0·75-0·95	—	—	—	13·0	—			—	—
22.	—	0·5-0·6	—	—	—	5·0	alloys Mo,W,V			—	—
23.	85Cr7A12	0·80-0·90	0·35 *Max*	0·35 *Max*	—	1·40-1·70	—	—	—	0·020	0·020
24.	84Cr5Mo3	0·80-0·88	0·35 *Max*	0·35 *Max*	—	0·70-2·00	0·25-0·35	—	—	0·020	0·020

NOTES

1 When the steel is Aluminium Killed, the minimum requirements for silicon shall not apply.

2 When so desired the purchaser and the manufacturer may agree to a particular composition for special purpose rolls.

3 The Aluminium content of grade 85Cr7Al$_2$ steel shall be 0·15 percent minimum.

stage of processing where hardness test is conducted and the number and location of tests may be agreed to between the manufacturer and the purchaser. A minimum of at least three hardness tests reading should be made to ensure required uniformity, both longitudinally and circumferentially.

8.1.1 If required, in case of hardened rolls shore hardness may also be carried out. Shore roll 'C' Scleroscope should be used with the stand which is a part of the instrument. The approximate relationship between shore roll 'C' Scleroscope and Vickers hardness for hardened steel rolls is shown in Fig. 1.

8.2 Ultrasonic Test

All forged rolls shall be ultrasonically tested to standard as agreed to between the manufacturer and the purchaser.

8.3 Magnetic Particle Test

The machined roll before delivery shall be inspected by magnetic particle test to ensure that the roll is free from cracks, seams and inclusion stringers.

8.3.1 All rolls shall be demagnetized after magnetic particle test.

9 FREEDOM FROM DEFECTS

9.1 Forged steel rolls shall be free from defect as mentioned in **8.1, 8.1.1** and other injurious imperfections.

10 TOLERANCES

10.1 Forged steel rolls be finished to the dimensional tolerances as agreed to between the manufacturer and the purchaser.

11 SURFACE FINISH

11.1 The roll barrel length shall have roughness 'Ra' value of 0·2 mm or better. Other portion shall have 'Ra' value of 1-2 mm. Any finer finish than specified above may be agreed to between the manufacturer and the purchaser.

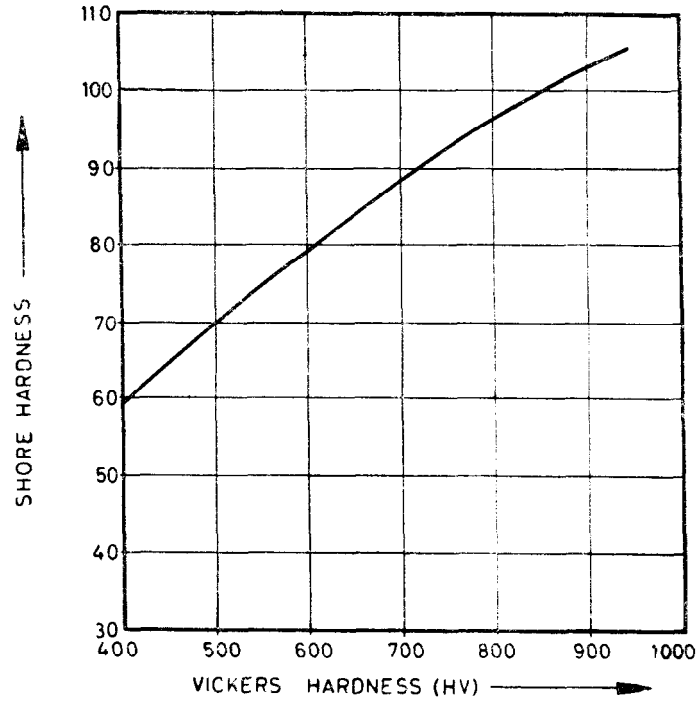


FIG. 1 GRAPH SHOWING APPROXIMATE RELATIONSHIP BETWEEN SHORE HARDNESS AND VICKERS HARDNESS

12 MARKING AND PACKING

12.1 Marking

Each roll shall be clearly marked with the purpose intended, manufacturer's name, type of roll, trade-mark, date and place of manufacture.

12.1.1 The material may also be marked with the Standard Mark. Details are available with the Bureau of Indian Standards, New Delhi.

12.2 Packing

Each roll shall be suitably packed to ensure delivery in good condition.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference :

Doc : No. MTD 18 (3721)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola CALCUTTA 700054	37 86 62
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43
Southern : C.I.T. Campus, IV Cross Road, MADRAS 600113	235 0216
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	6 32 92 95

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. PATNA. THIRUVANANTHAPURAM.

Printed at Swatantra Bharat Press, Delhi, India